LATE CRETACEOUS FOSSILS FROM THE BLUFFTOWN FORMATION (CAMPANIAN) IN WESTERN GEORGIA

By

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Introduction

The Blufftown Formation (Upper Cretaceous; Campanian) reaches thicknesses up to 180 m in the Chattahoochee River Valley, at the Georgia–Alabama border, and comprises a substantial areal outcrop; nevertheless, few good exposures of the uppermost beds are available for study in its downdip (*i.e.*, southerly) region. In part, this is due to flooding of the river valley subsequent to construction of a dam at Fort Gaines, Georgia, which simultaneously created Lake Eufaula and drowned some of the finest Late Cretaceous fossil beds in the Southeast.

Although riverside outcrops, including the Blufftown Formation's stratotype, are largely inundated, the uppermost Blufftown is well-exposed in stream cuts which roughly parallel the formation's strike along Hannahatchee Creek in Stewart County, Georgia. Approximately 3 km of strata are exposed, and these outcrops contain rich fossil biotas (uniquely in the region) abundant vertebrate material. The fossil bone-bed overlies a prominent erosional surface, which can be traced for most of the streamside exposure. Based on its stratigraphic position above this surface, and on the style of preservation of the fossils, the bone bed is interpreted as residual phosphatic lag.

Among the more spectacular finds at the Hannahatchee Creek site are fragmentary bones of the first dinosaurs and mosasaurs that can be attributed with certainty to any Georgia collection. In addition, an *in situ* bioherm, built around interlocking shells of the distinctive large oyster, *Crassostrea cusseta* Sohl & Kauffman, 1964, is located along Hannahatchee Creek, comprising the first discovery of this geographically restricted species in life position.

The paleoenvironments represented by this outcrop may be interpreted with good precision because of the rich admixture of invertebrate and vertebrate fossils; these represent marine, nonmarine, and paralic habitats, and include taxa which are certainly in life positions (*i.e.*, the reef-forming oysters).

The Mosasaur, 3:109–123

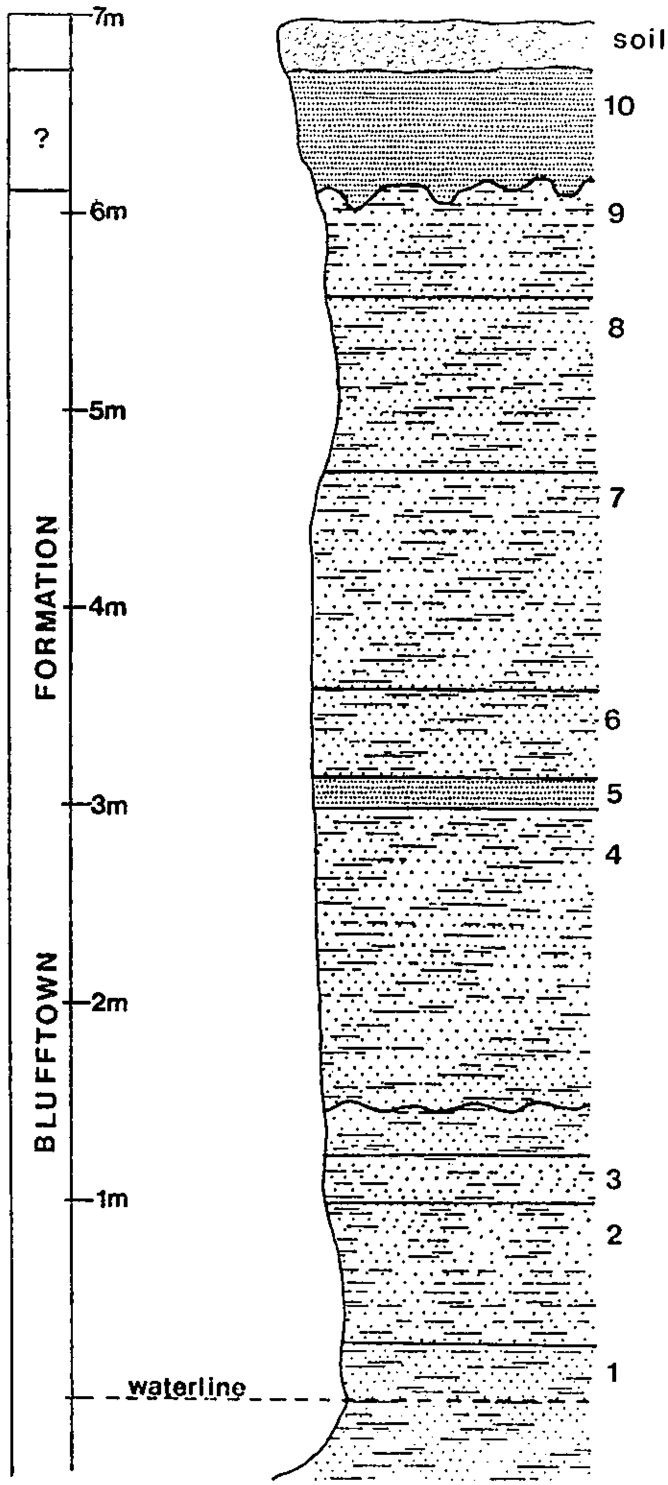
Previous Work

Paleontology in the Blufftown Formation has been described chiefly by Stephenson (1911). In general, the biota consists of a characteristic, diverse, Late Cretaceous *Exogyra ponderosa* range-zone assemblage such as one finds in much of the Atlantic and Gulf Coastal Plains. The taxa described by Stephenson include many dozen mollusks, along with a typical shallow-water assemblage of crabs, bryozoans, trace fossils (especially *Hamulus* sp. and "*Halymenites*" [= *Ophiomorpha*] *major*), lignitized wood, and teeth from several shark taxa.

However, three elements in Stephenson's (1911) description of the Blufftown fossils are distinctive with respect to other Late Cretaceous Coastal Plain reports: the first was mention of a new and very large oyster in several downdip outcrops; second was the presence of *Exogyra ponderosa erraticostata* in lieu of the smooth-shelled subspecies; and third was brief mention of fragmentary reptilian fossils. Two additional publications also mentioned vertebrate fossils from the Chattahoochee River Valley in Georgia: Cope (1878) and Hays (1907). The focus of this report will be on the three distinctive components of the fossil biotas mentioned above, and most especially, on my apparent rediscovery of a very diverse vertebrate fossil biota in the Blufftown Formation.

Figure 1. Composite section of the upper Blufftown Formation exposed at Hannahatchee Creek, 3 km west of town of Union, Stewart County, Georgia.

Unit	
10	MEDIUM SAND, very micaceous, light brown (5 YR 6/4), iron-stained on exposed surfaces, contains lignite specks, less than 2% dark minerals.
9	MEDIUM SANDY CLAY, micaceous, unfossiliferous, mottled dusky yellowish brown (10 YR 2/2) and pale brown (5 YR 5/2)
8	SILTY, FINE SANDY CLAY; same as unit 2.
7	FINE TO MEDIUM SANDY, SILTY CLAY, micaceous, lignitic, fossiliferous, calcareous, medium-dark gray (N 4), may be bioturbated and shows no bedding.
6	SILTY, FINE SANDY CLAY; same as unit 2, except more calcareous and very fossiliferous, with common beds of mollusk hash
5	COARSE SAND AND *Turritella*/BIVALVE SHELL HASH, dusky yellow (5 Y 6/4), forms distinct marker horizon.
4	CLAYEY FINE SAND AND SILTY CLAY, micaceous, lignitic, very fossiliferous, olive-gray (5 Y 3/2). Calcareous, sandy concretions abundant throughout unit. Zones of molluscan hash locally present. Prominent erosional horizon in lower meter, traceable throughout exposure, features abundant vertebrate bones and teeth, and very-large-oyster bioherm.
3	SILTY, FINE SAND, micaceous, calcareous, medium gray (N 5), mollusk fragments and lignite specks in graded beds, zones of nearly pure fossil hash, dominated by *Hamulus*.
2	SILTY, FINE SANDY CLAY, micaceous, poorly fossiliferous, mottled olive-gray (5 Y 4/1) and light olive-brown (5 Y 5/6).
1	FINE SANDY CLAY, very micaceous, sticky, poorly fossiliferous, olive-gray (5 YR 3/2).


7m
6m
5m
4m
3m
2m
1m
?
BLUFFTOWN FORMATION
waterline
soil
10
9
8
7
6
5
4
3
2
1

No substantial paleontological studies of the Blufftown Formation followed Stephenson (1911). Several regional guidebook and stratigraphic reports listed or mentioned fossils, but these largely repeated data from the Stephenson paper: included in this category are Cooke (1943), Herrick & LaMoreaux (1944), Eargle (1955), Richards & Hand (1958), and Marsalis and Friddell (1975). (Note, however, that the definition of the Blufftown Formation itself has changed considerably and the present usage follows Eargle, 1955.) I presented an early version of this paper (Schwimmer, 1981), which is substantially revised here. Two taxonomic papers dealing with Cretaceous oysters are also relevant to the Blufftown fauna: Stephenson (1914) formally designated the *Exogyra ponderosa* subspecies *erraticostata*, which occurs at Hannahatchee Creek; and Sohl & Kauffman (1964) formally named and systematically described the large oyster *Crassostrea cusseta*, which forms the reef facies to be discussed.

Stratigraphy

The Blufftown Formation exposed along Hannahatchee Creek is grossly typical of regional Upper Cretaceous back-barrier sediments. The uppermost unit of the formation, which yields the fossils considered here, is generalized in Figure 1. Along Hannahatchee Creek, the exposed sediments are composed largely of gray to olive-green, micaceous, fine sand, silt, and marly clay, with numerous calcareous sandstone concretions. Of particular interest here is the section adjacent to the vertebrate bone-and-oyster bed (incorporating units 3 to 4 in Figure 1). These sediments suggest sizeable fluctuations of sea level, including sequences of probable storm deposits in unit 3, and the erosional surface in unit 4 indicating partial subaerial exposure.

Many upper Blufftown strata are very fossiliferous, although carbonate fossils are generally badly leached, and mollusk shells (notably gastropods, siphonate clams, and ammonites) require *in situ* hardening to recover. Many zones of finely comminuted shell "hash" can also be found, suggesting that brief periods of higher energy conditions interrupted the prevailing quiet water which deposited intact shells.

Oyster shells are often bored, apparently by sponges. Lignite is commonly found riddled by *Teredo* (shipworms). Trace fossils have not been studied in detail, but numerous tubes attributable to *Hamulus* sp. are found in high concentrations along several thin bedding planes. Also abundant are large worm tubes of the *Skolithos* type.

Paleontology

Invertebrates. The lists of fossils presented by Stephenson (1911) or Cooke (1943), from several Blufftown Formation outcrops in Stewart County, are generally adequate to delimit the invertebrate fossils at Hannahatchee Creek. Stephenson's (1911) fauna from outcrops at the town of Florence, and at Roods Creek, Georgia (exposed prior to flooding of Lake Eufaula), represent approximately the same downdip, uppermost Blufftown beds that are described here, and the list of taxa are essentially the same I have observed in the field (although many generic and specific assignments have been revised). The discussion of invertebrate fossils here will focus on two oysters, which (despite their distinctions) comprise a small portion of the biota.

The oyster bioherm mentioned previously is a rare occurrence in the Cretaceous of the Coastal Plain, and is all the more unusual in that it is built up by a most unusual organism. This oyster, *Crassostrea cusseta* Sohl & Kauffman, 1964 (see Plate 1, Figs. L, M), is among the largest of Cretaceous oyster species, reaching lengths well over 50 cm. The taxon was described originally from the Cusseta Formation in several outcrops near the study area, but the authors did note the occurrence of at least one specimen from the Blufftown Formation on the Alabama side of the Chattahoochee River. The bioherm facies observed at Hannahatchee Creek (see Plate 1, Fig. O) is the first record of *in situ* occurrence of this organism. The bioherm itself is exposed for approximately 35 m in the streamside outcrop but it forms a topographic prominence of only approximately 0.3 m above the surrounding sandstone. The oysters forming the framework are cemented to each other and other materials (including several unusually large arcoid bivalves of undetermined genus and species) in a manner very much like modern *Crassostrea virginica*; indeed, the Cretaceous bioherm very much resembles a modern oyster bed at 5X magnification!

The other notable element in the invertebrate fauna is the occurrence exclusively of *Exogyra ponderosa* var. *erraticostata.* Although *Exogyra* species are ubiquitous index fossils on the Coastal Plain, their systematics remain murky after more than 70 years of study. Based on ammonite and nannoplankton biostratigraphy (*fide* Reinhardt), the Hannahatchee Creek strata belong to the uppermost *E. ponderosa* range zone; yet, the *Exogyra*'s that one finds here are rather more similar morphologically to many specimens of *E. costata* (which comprise the next range zone) than to typical *E. ponderosa.* To date no modern, comprehensive analysis of *Exogyra* species has been attempted (Lerman, 1965, did analyze evolution among three species but he did not include *erraticostata*), and the Hannahatchee Creek specimens suggest that there are problems in delimiting the morphological limits (and, hence, ages) of *Exogyra* index species.

Vertebrates. In the "Previous Work" discussion, I listed, in addition to Stephenson (1911), two early papers which mentioned Cretaceous vertebrate fossils from the Chattahoochee River Valley. These three references comprise the existing vertebrate paleontology literature of the Blufftown. Stephenson (1911) listed the following higher vertebrate fossils which may be traced to the Blufftown Formation in Georgia:

> "Fragments of the turtle *Taphrosphys* (?)
> vertebra (and teeth of mosasauroid reptile
> *Thecachampsa rugosa* Emmons (vertebra)
> *Polydectes biturgidus* Cope (teeth)
> scute of a gavial-like crocodile"
> (identifications by C. W. Gilmore)

Cope (1878), in a single paragraph, reported a vertebrate fossil collection in possession of the Georgia Geological Survey, which included bones of the dinosaur "*Hadrosaurus tripos*," and the turtles *Taphrosphys strenuus*, *Amphiemys oxysternum*, *Peritresius ornatus*, and *Adocus* sp. Hay (1908) reviewed the systematics of the rare side-necked turtle *Peritresius ornatus*, and included a detailed description of the specimen mentioned by Cope (1878). Hay also reported that the locality from which the *Peritresius* was collected as "Bonnahachee Creek, Stewart County Georgia" (which does not exist on current maps and almost certainly is the site discussed here).

Unfortunately, none of the abovementioned Cretaceous vertebrate fossils from Georgia can be found in existing repositories; furthermore, none were originally illustrated in the works cited. The sole fossil mentioned above which exists in the flesh (so to speak) is the *Amphiemys* turtle carapace, which is reposited in the Georgia State Capital Museum, and is of Miocene age from Macon County. Horner (1979) published a "checklist" of eastern dinosaur fossils in museum collections, and failed to discover any material from Georgia (nor has he subsequently encountered such; 1982 personal communication). The U.S. National Museum contains neither Stephenson's nor Cope's Georgia vertebrates (R. W. Purdey, 1982 personal communication), nor are they in the Georgia Geological Survey collection (E. A. Shapiro, 1982 personal communication). To compound the problem, the taxon "*Hadrosaurus tipos*", to which Cope assigned the Georgia dinosaur material, was originally based on his misidentification of two Cenozoic white whale vertebrae from North Carolina (see Lull & Wright, 1942, and Baird & Horner, 1979); therefore, despite Cope's recognized expertise on Cretaceous dinosaurs, one is unsure precisely what he was examining in the now-vanished Georgia State Survey collections.

Fish fossils from the region have received even less detailed treatment. Stephenson (1911) identified only the following fish in the Blufftown Formation:

Lamna texana Roemer
Otodus sp.
Corax falcatus Agassiz
Ischyrhiza mira Leidy

No subsequent publications did other than reproduce these taxa in faunal lists.

The recent collecting, which forms the basis of this study, shows that there is a large and diverse vertebrate biota in the upper Blufftown, albeit represented by water-abraded, redeposited bone-scraps and teeth. The following list includes all vertebrate taxa discovered to date (fish identified by G. R. Case; reptiles by D. Baird and myself):

PISCES

Chondrichthyes

	(common names)
Selachii	
Heterodontus sp.	Port Jackson shark
Hybodus sp.	hybodont shark
Lonchidion babulskii Capetta & Case	hybodont shark
Squalicorax kaupi (Agassiz)	tiger shark?
Pseudocorax affinis (Agassiz)	tiger shark
Squatina hassei Leriche	monk shark
Ginglymostoma globidens Capetta & Case	nurse shark
Scapanorhynchus texanus (Roemer)	goblin shark
Cretolamna appendiculata lata (Agassiz)	mackerel shark
Plicatolamna borodini Capetta & Case	mackerel shark

Batoidea

Ischyrhiza mira mira Leidy	ganopristine sawfish
Ptychotrygon vermiculata Capetta	gonopristine sawfish
Brachyrhizodus wichitaensis	ganopristine sawfish?
Pseudohypolophus sp.	undet. extinct ray
Rhombodus levis Capetta & Case	guitarfish

Osteichthyes

Holostei

Lepisosteus sp.	gar
Anomaeodus phaseolus (Hay)	pycnodont
Amiidae, gen. et sp. indet.	

Teleostei

Albula sp.	bonefish
Paralbula casei Estes	bonefish
Enchodus cf. *E. petrosus* Cope	salmonid?
Stephanodus sp.	indet. extinct taxon
Xiphactinus audax Leidy	"Portheus"

REPTILIA

Chelonia

Cryptodira

Trionychidae, gen. et sp. indet.	soft–shelled turtle
Cheloniidae, gen. et sp. nov.	new large marine turtle

Pleurodira

Bothremys barberi (Schmidt)	"pavingstone turtle"

Archosauria

Crocodilia

Thoracosaurus neocesariensis (De Kay)	gavial–like crocodile
Deinosuchus cf. *D. rugosus* (Emmons)	giant, estuarine crocodile
indet. crocodilia	

Ornithischia

Hadrosauridae, gen. et sp. indet.	duckbilled dinosaur

Saurischia

Therapoda, gen. et sp. indet.	carniverous dinosaur

Lepidosauria

Squamata

Platecarpus sp.	mosasaur
Prognathodon sp.	mosasaur
Halisaurus sp.	mosasaur
Mosasauridae, gen. et sp. indet.	mosasaur

These are characteristic of Campanian-age Coastal Plain assemblages from New Jersey (Baird & Case, 1966), North Carolina (Miller, 1966, 1967, 1968; Baird & Horner, 1979; Case, 1979), and western Alabama (Zangerl, 1948, 1953, 1960; Langston, 1960; Russell, 1970; Applegate, 1970; Shannon, 1977). Additionally, many taxa are also known from contemporary chalk units in Kansas and South Dakota. Two apparently new taxa are present: one a very tiny sawfish represented by several rostral barbs and oral teeth (description in prep. by G. R. Case); the other, a large marine cheloniid turtle, represented by several bones from the anterior carapace and a right innominate, not attributable to any known genus (description in prep. by Donald Baird and me).

The distinctive aspects of this assemblage are the location, diversity, and relative proportions of taxa found. The most abundant reptiles are the "pavingstone turtle" *Bothremys barberi* and, surprisingly, the giant crocodile *Deinosuchus*. At least one hundred kilograms of *Bothremys* material have been recovered, apparently derived from several dozen individual animals. Similarly, the combined collections by my students, several amateur collectors, and myself, include over 60 teeth from *Deinosuchus*, and a dozen miscellaneous bones. There are no precise means to determine how many individuals are represented by these *Deinosuchus* fossils, but it is probably a sizeable number (based on varying sizes, locations, and preservation).

Mosasaur material is relatively rare (given its abundance in many contemporary marine strata) and dinosaur material is even more scarce; nonetheless, the half-dozen scraps of dinosaur bone in the collection are significant regional occurrence records. No plesiosaur or pterosaur fossils have yet been found in the Blufftown. (However, two bones from a large pterosaur have been recently described from the Eutaw Formation near the study area; see Schwimmer *et al.*, 1985.)

Among the megascopic fish fossils, the shark taxon *Scapanorhynchus texanus* comprises over 90% of the material, represented by several thousand teeth and vertebrae. A surprisingly large amount of material from the sawfish *Ischyrhiza mira mira* is also present, along with numerous teeth from *Xiphactinus audax* (these reach lengths of nearly three inches and may be mistaken for plesiosaur teeth). All other megascopic fish materials are relatively rare; nevertheless, virtually any quantity of sieved sediment will contain at least a half-dozen microscopic oral teeth from the various rays, hybodont sharks, and pycnodont bony fish listed.

Paleoenvironmental Implications

The following discussion presents chronological scenarios on the depositional and paleoenvironmental histories of the few meters of Blufftown strata exposed along Hannahatchee Creek. The units shown in Figure 1 will be used as time-stratigraphic references.

Units 1 and 2 times represent intervals of typical, low-energy, back-barrier environmental conditions (very much like prevailing environments of deposition for the entire upper Blufftown Formation). Fossils are not common and these include mostly intact *Exogyra* valves and other large bivalve shells, many with sponge borings. Large ammonites (*Placenticeras* sp.) are abundant locally, and these suggest free communication with the hemipelagic realm. Shark teeth are relatively common, but no more so than in typical Coastal Plain sediments. Fossils of other vertebrates are rare in this unit but, when found, tend to occur in large pieces. The well-preserved *Platecarpus* dentary material (Plate 2, Fig. J) and the carapace from the new cheloniid turtle (Plate 2, Fig. D) came from these units. Since the characteristic vertebrates (*i.e.*, sharks, mosasaurs,

and sea-turtles) are fully-marine creatures, their occurrences support the contention of normal marine conditions within the back-barrier lagoon. In summary, Units 1 and 2 were deposited during times of relatively high water, with little fluvial influence, and represent soft, slightly eutrophic bottom substrates which inhibited habitation by many benthonic organisms.

Unit 3 represents the onset of a regressive period. Water depths were sufficiently shallow to allow storms to rip up the sediment and redeposit bivalve shell-hash and *Hamulus* tubes in numerous thin, graded sequences. Inconclusive evidence of increased freshwater influence is provided by many lingulid valves, in good condition, interbedded with the shell hash. The Blufftown lagoon at this stage apparently was shallowing and approaching subaerial exposure. Freshwater may have been entering as storm runoff or via rivers.

Unit 4 represents a continuation of the regression, during which deposits of the old lagoon were succeeded by deposits of a tidal marsh which were exposed to subaerial weathering at low tide. The *Crassostrea* bioherm developed for a brief period, and a host of creatures lived on and around it, and probably were nourished by it. The very-shallow-water environment supported an unusually large and diverse vertebrate fauna, notably including many *Bothremys* turtles and a few duckbilled dinosaurs. Many estuarine crocodiles, including gigantic (dinosaur-eating) taxa, smaller fish-eating taxa, and rare carnivorous dinosaurs, preyed on the other large inhabitants. Fully marine vertebrates (mosasaurs, larger sharks, larger sea-turtles) are represented only by isolated teeth, suggesting that the fossils are derived from beached or wave-carried carcasses. Forests on nearby barrier bars and the fringes of salt marshes yielded abundant driftwood. There is a significant non-marine biota present, including trionychid turtles, the driftwood, the crocodiles, and the dinosaurs; however, the mollusks in the sediment indicate normal-marine salinities. In summary, therefore, a river probably debouched near the study area, but at sufficient distance so that the local waters maintained normal marine salinities; the general environment might best be classified as estuarine at this stage.

Unit 5 represents a back-barrier beach, indicating the maximum stage of regression during this cycle. The sand includes abundant, megascopically-recognizeable mollusk fragments and suggests that wave energies were only moderate.

Unit 6 time represents a slight rise of sea level. The diversity and abundance of intact marine invertebrate fossils is highest in this unit, suggesting that the estuary was at optimum depths for benthonic inhabitants, and that storms did not characteristically tear up the bottom. Nevertheless, some shell-hash zones are present, and several localities feature sizeable concentrations of abraded shark, crocodile, and mosasaur teeth, and water-rounded marine and non-marine reptile bone fragments. Thus, sea level was still sufficiently low for storms to reach bottom on occasions, followed by long quiet-water intervals during which the reworked bone was current-concentrated and redeposited.

Units 7 through 9 contain alternating equivalents of units 1 through 4 (although without recurrence of the erosional surface in unit 4) and unit 6, suggesting that generally higher, but unstable, sea levels prevailed through the rest of Blufftown time. The erosional surface above unit 9 represents either the termination of Blufftown deposition, or post-depositional erosion; the interpretation depends heavily on the nature of unit 10, which is presently under study. It may be either part of the Cusseta Formation (thereby indicating renewed Late Cretaceous transgression) or a post-Cretaceous terrace deposit. The sediment in unit 10 (light-colored, medium sand) generally resembles that of unit 5; however, this resemblance could be due to reworking of older material. Further study hopefully will elucidate the history of the absolute uppermost Blufftown and overlying units in the study area.

Acknowledgements

I wish to thank the following paleontologists for their help in identifications of taxa (listed in chronological order of the date I sought information): Eugene Gaffney, John Horner, Stephen Barghoorn, Donald Baird, Gerard Case, John Thurmond, Wann Langston, Gorden Bell, Kenneth Wright. Many students and amateurs have collected fossils from the study area which contributed invaluably to knowledge of the fauna. These include (again, in chronological order): Robert Best, William Dillard, Mark Zastrow, Steven Sherer, William Childers, Robert Rollier, Jr., Craig Lloyd, Charles Turner, Thomas Scheiwe, Dana Cason, Deborah Hunt, and Glenda Gosnell.

Finally, I wish to thank the Columbus College Foundation for support of this research through several grants, and Juergen Reinhardt and William Frazier for valuable discussions on the formation in study.

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PLATE I

Representative fish fossils and distinctive oysters from the study area.

Most specimens from the erosional horizon in unit 4 (Fig. 1), except specimens N which come from upper beds of unit 4. All catalog numbers refer to Columbus College collections.

A — *Scapanorhynchus texanus* (Roemer). Positions of teeth shown are: *a*, anterior; *b*, extreme lateral; *c*, *d*, mid–lateral. All specimens X 1.

B — *Squalicorax kaupi* (Agassiz). Positions of teeth shown are: *a*, anterior; *b*, mid–lateral; *c*, lateral. All specimens X 1.

C — *Cretolamna appendiculata lata* (Agassiz). Positions of teeth shown are: *a*, extreme lateral; *b*, mid–lateral; *c*, anterior. All specimens X 1.

D — *Ischyrhiza mira mira* Leidy. *a*, *b*, rostral (saw) teeth (X 1), CCK–83–88–1,2; *c*, *d*, oblique and occlusal views of an oral tooth (X 20).

E — *Hybodus* sp., cephalic hooks. *Above*, ventral view of specimen CCBCK–82–3–2 with anterior tip missing; *below*, oblique–lateral view of CCBCK–82–3–3, a more complete hook. Both X 1.

F — *Ptychotrygon vermiculata* Capetta. Two views of oral tooth; *above*, oblique–posterior; *below*, occulusal view. Both X 20.

G — *Enchodus* cf. *E. petrosus* Cope. Anterior tooth, CCBBK–116–9–1; X 1.

H, I — *Xiphactinus audax* Leidy. *H*, anterior tooth, CCK–85–2–1; *I*, dorsal vertebra, CCK83–81–8. Both X 1.

J — *Lepisosteus* sp. Isolated scale, CCBCK–83–2–1; X 1.

K — *Anomaeodus phaseolus* (Hay). Two views of pharyngeal tooth element; *above*, occulusal; *below*, basal. Both X 25.

L, M, O — *Crassostrea cusseta* Sohl & Kauffman. *L*, nearly complete right valve, CCK–85–5–73, X 0.3; *M*, nearly complete right valve in bioherm facies, knife for scale is 16 cm long; *O*, *Crassostrea cusseta* bioherm surface, showing individuals cemented together laterally and at various attitudes, knife for scale is 12.5 cm long.

N — *Exogyra ponderosa* var. *erraticostata* Stephenson. *Above*, large individual with ornamentation partly ablated (X 0.4), CCK–82–3–4; *below*, specimen showing strong ornamentation (X 0.5), CCK–86–7–2.

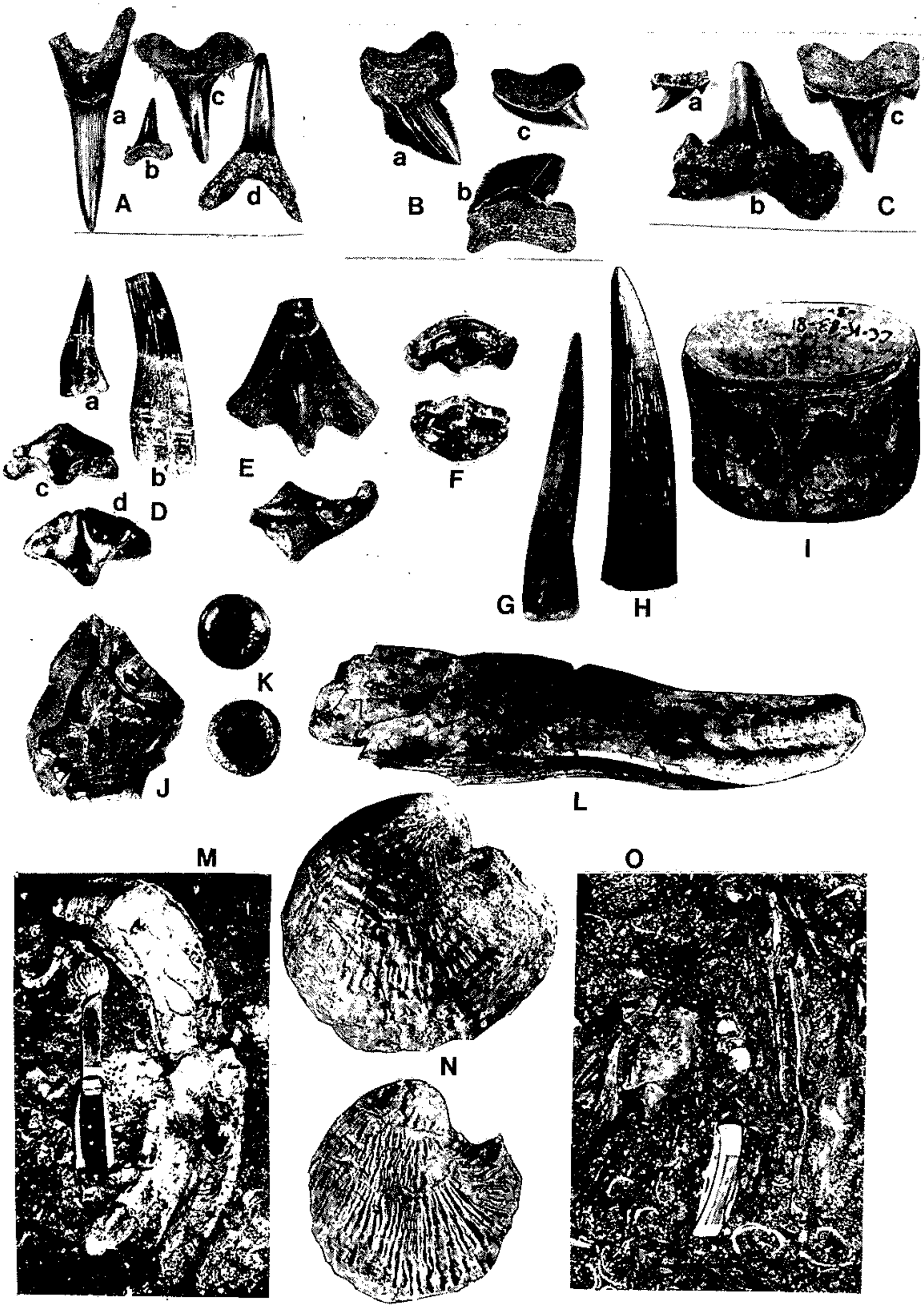
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PLATE II

Representative reptile fossils from the study area.

All specimens from the erosional horizon in unit 4 (Fig. 1) except D and J, which are from unit 2. All catalog numbers refer to Columbus College collections.

A, B — Hadrosauridae, gen. et sp. indet. *A*, water–rounded fragment of left, posterior dentary, in labial (left) and lingual (right) views; with traces of the alveoli for six posterior teeth are visible in the right photograph (X 0.5), CCK–79–3–1; *B*, fragments of limb bones, from indeterminable positions (X 0.3), CCBBK–111–1,2.

C — *Trionyx* sp. Costal fragment, showing characteristic ornamented surface (X 0.7), CCK–79–4–1.

D — Cheloniidae, gen. et sp. nov. Reconstruction of anterior carapace from fragments of nuchal and peripheral bones (X 0.2), CCK–79–4–1.

E, F — *Bothremys barberi* (Schmidt). *E*, ventral view of first three costals of the left carapace (X 0.3), CCBRK–83–1–2; *F*, vertebral bone (X 0.75), CCSSK–81–7–1.

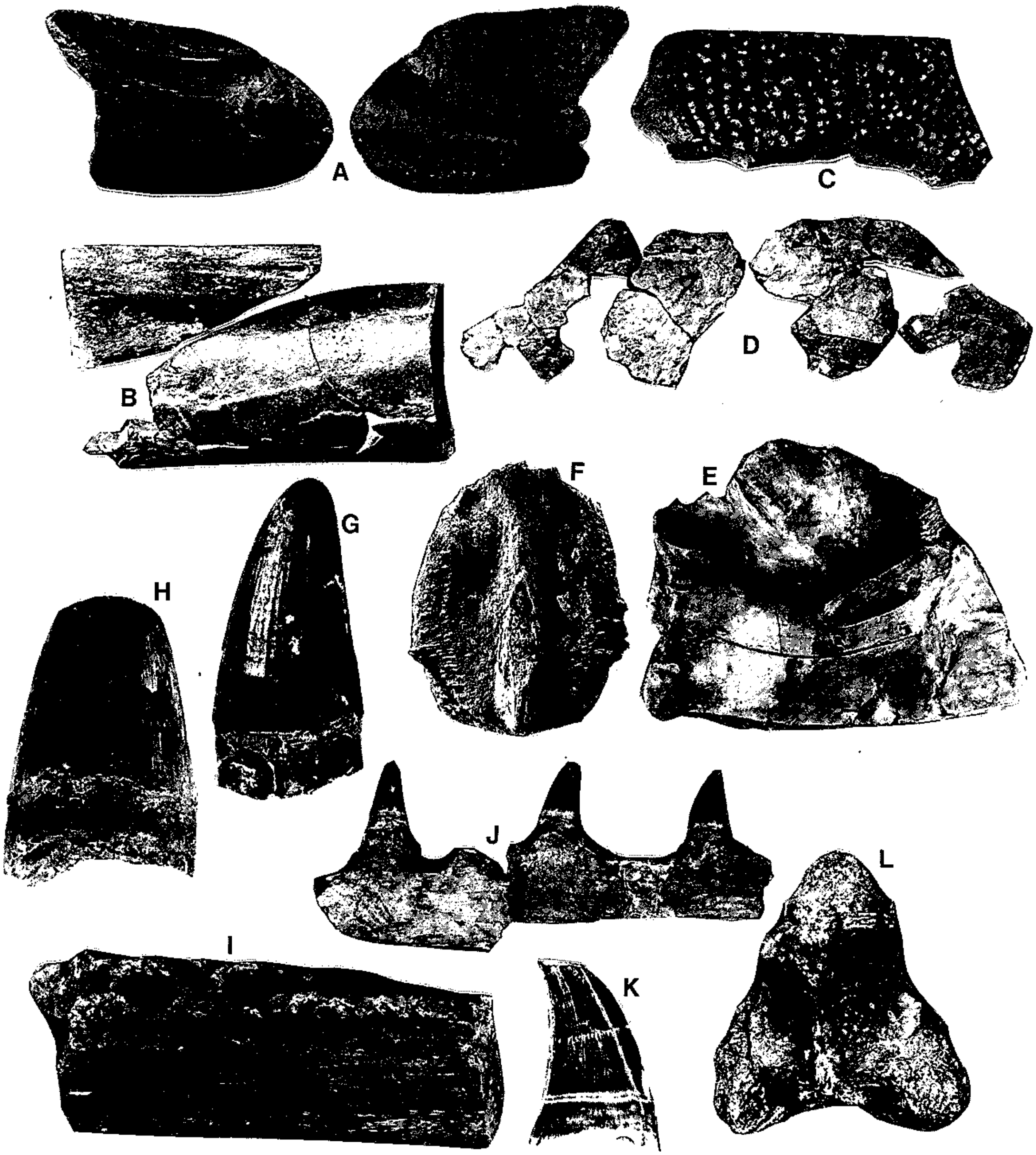
G, H — *Deinosuchus* cf. *D. rugosus* (Emmons). *G*, anterior or anterolateral tooth, CCK–85–3–3; *H*, posterior tooth, tip ablated, CCCTK–84–11–1. Both X 0.8.

I — *Thoracosaurus neocesariensis* (De Kay). Left dentary fragment with four tooth alveoli (X 0.75), CCBBK–112–1.

J — *Platecarpus* sp. (*Left*), anterior fragment with single tooth and replacement alveolus, CCBCK–4–1; (*Right*), mid–jaw fragment with two teeth, CCK–82–23–1. Both specimens from left dentary of same individual, X 0.7.

K — *Prognathodon* sp. Isolated tooth, showing smooth enamel with fine striations and extremely fine serrations on the anterior carina (X 0.9), CCDHK–84–14–1.

L — *Halisaurus*? sp. Water–rounded vertebra (X 0.75), CCDHK–84–14–2.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